

AN EVALUATION OF ENTOMOLOGICAL WARFARE

AS A POTENTIAL DANGER TO THE

UNITED STATES AND EUROPEAN NATO NATIONS (U)

Ву

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U.S. ARMY DUGWAY PROVING GROUND Dugway, Utah 84022



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Table 1. (U) Resource Cost Summary for an F. sularensis Aerosol Attack on a Battalion.

ltem	Cost (1976 S	
Planning	8,750	
Agent Production	10,000	
Munition Acquisition	9,897	
Weapon Employment	5,700	
TOTAL:	34,347	

1.5.1.2 (U) Attack with Yellow Fever Infected Mosquitoes. The cost of attacking a 7.5-km² area (battalion) with yellow fever-infected mosquitoes was estimated. Where possible, costs of equipment were taken from 1976 catalogues to make the cost comparison with the aerosol attack as valid as possible. The feasibility of area coverage with A. maggypti mosquitoes was based on the Avon Park, Florida mosquito trials described in Section 4 (11,12). Approximately 225,000 infected female A. maggypti are required for this hypothetical attack. The mosquitoes would be released from a helicopter 610 m upwind of the target area. Table 2 contains the resource cost summary for this attack. See Table 6 page 46 for the estimated cost of munition items for the F. maganaris attack and Table 7 page 49 for the estimated cost of items to raise 225,000 yellow fever infected mosquitoes.

Table 2. (U) Resource Cost Summary for a Yellow Fever-Infected Mosquito Attack on a Battalion.

ltem	Cost (1976 S)	
Planning	8,750	
Agent Production	9,066	
funition Acquisition 2.150		
leapon Employment 5,700		
TOTAL:	26,666	

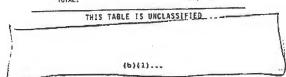
⁽U) Tables 1 and 2 demonstrate the probable cost differential for an aerosol versus EM attack when considering a given limited area such as that occupied by a mechanized battalion in the field. In actuality, an EM attack of this type on a military unit would probably not be attempted because complete control of the airways would be necessary and the attack would not be covert. The same would be true for a pathogen aerosol attack attempted this close to the target area.

1.5.2 City Attack.

- 1.5.2.1 (U) Attack with Yellow Fever-Infected Mosquitoes. The cost of attacking an urban area covertly with yellow fever-infected mosquitoes was estimated. It was assumed the cost of planning a city attack with yellow fever-infected mosquitoes is comparable with the cost of planning an aerosol attack on Mashington. DC (scenario 7 of reference 10). In the present hypothetical attack, 16 simultaneous attacks were planned at a total planning cost of 58,750. The cost of one attack would be 5547.00 (58,750) 16).
- (U) Agent production would involve producing 225,000 yellow fever-infected female A. accepted. This is the same number used in the hypothetical bactalion attack so the cost would be the same (\$9,066).
- (U) Munition acquisition was estimated to be \$500.00 and weapon employment (truck rental and wages of two semi-skilled people for eight hours) was estimated to be \$360.00. These costs are summerized in Table 3.

Table 3. (U) Resource Cost Summary for a Yellow Fever-Infected Mosquito Attack on a City.

Cost (1976 S)
547
9.066
500
360
10,473



(U) The costs of agent production, munition acquisition, and weapon employment were also taken from scenario 7 of reference 10. The one exception to this was for weapon employment. Scenario 7 included the travel and per diem costs of foreign agents traveling to the US to conduct the attack. In the presently described scenario, people to conduct the attack were considered to be already in the US. This makes the costs comparable to those for the yellow fever mosquito attack on a

city where attack personnel were considered to be already in the US. The costs are summarized in Table 4.

Table 4. (U) Resource Cost Summary for an F. tularensis
Aerosol Attack on a City.

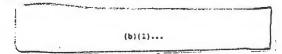
Item	Cost (1976 S)	
Planning	547	
Agent Production	174,000	
Aunitian Acquisition	1,435	
Neapon Employment	3,250	
TOTAL;	179,232	

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1.5.3 Cost Comparison Summary.



(U) The closeness of agent and agent vector release in these two types of attacks (610 m upwind of the target area) would preclude the advantage of covertness. Therefore, personnel having access to protective masks during an F. exizameses aerosol attack would probably have the opportunity to take advantage of this method of protection.



{U} It has been estimated that between 50 and 90 percent of a nonimmune population bitten by infected yellow fever mosquitoes will become infacted and 30 to 60 percent of the victims will die (12). Thus >50 percent of the personnel in the battalion would likely become incapacitated and a large number would die.

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Table 5. (U) Various Estimates of Cost per Death for an F. suiarensis Aerosol Attack on a City.

Percent Deaths	Number of Deaths	Cost Per Death (1976 5)
5	62,500	2.86
10	125,000	1,43
20	250,000	0.72
30	375,000	0.48
40	500,000	0.36
50	625,000	0.29

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Straptomycin, kanamycin, and chloramphenicol are also effective against S. tularensis, although some strains of F. tularensis are resistant to straptomycin.

SECTION 3. THTELLIGENCE INFORMATION (U)

(U) Since World War Π several reports have indicated the Soviet Union has an interest in EW.

3.1 HIRSCH REPORT

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- (U) The prisoners, reportedly in chains, were placed in an eightman tent which had a number of plague-infected rats and flees under wire nets on the floor. Most of the prisoners developed bubonic plague after being bitten by the flees. Ground squirrels and other rodents were reported to have been used in similar experiments and proved to be efficient intermediary hosts. The escape of a prisoner infected with bubonic plague started a great epidemic among the Mongols in the summer of 1941. Three to five thousand Mongols were reported to have died in this epidemic and were disposed of by burning or burying with disinfectants.
- (") Ticks were also reported to have been used to transfer tickborne encephalitis to prisoners. In addition, infected fleas and other insect vectors were dropped from aircraft in paper containers.

3.2 MASS PRODUCTION OF AEDES AEGYPTI



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SECTION 4. HISTORY OF EX FIELD TESTING IN THE US (U)

4.1 OPERATION BIG (TCH (8.12)

- (a) In 1954 a series of trials was conducted using description of fleas) in E-14 munitions with cardboard and sponge inserts. The insects were dropped from altitudes of 305 and 610 m over US Army Dugway Proving Ground (DPG). Utah to: (1) investigate the suitability of the munition components for dissemination of these arthropod vectors; (2) determine survival and host acquisition ability of X. Jacopta disseminated from these devices; (3) plot carrier patterns produced by E-14 munitions filled with the special carriers.
- (U) The fleas were successfully reared to the appropriate stage, then dropped on the target with little or no die-off. After release, the insects were successful in acquiring hosts but were not active longer than 26 hours. The sponge carriers were the most widely distributed, as indicated by carrier patterns.
 - (U) No calculations of effects were attempted in this report.

4.2 OPERATION BIG BUZZ (12.14)

- (U) In May 1955 a field test was conducted in Georgia to (1) demonstrate the feasibility of mass-producing, storing, loading into munitions, and disseminating mosquitons from aircraft, and (2) to determine if the mosquitoes would survive the airdrop and take blood meals from humans.
- (U) More than one million uninfected 3. aegupti were produced and stored for nearly two weeks. About one third of these mosquitoes were placed in E-14 munitions (containing "aircomb waffles" and "loop tubes") and in 0.76 m rocket-shaped ground release munitions, and dropped, without mortality, from aircraft, The remaining mosquitoes were used in munition loading and storage tests. Mosquitoes were leased from E-14 munition loading and storage tests. Mosquitoes were cleased from E-14 munitions when they were 91 m above the ground. The mosquitoes were dispersed by the wind and their own flight and were collected as far as 610 m downwind from the target release site. The female mosquitoes were active in sæking blood meals from humans and guinea pigs.



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4.5 OPERATION MAY DAY (12,17)

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(U) Operation MAY DAY consisted of studies of 4. caggorf activity and dispersion in an urban arma (Savannah, Georgia) from April to Kovember 1956.

(U) The tests were designed to give information on the dispersal of A. account from a ground level point-source release in a short period of time. Results were based primarily on mosquito recoveries obtained in dry-ice baited traps. In these tests a small fraction (0.5 percent to 7.75 percent) of the total number of mosquitoes

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SECTION 7. CONCLUSIONS AND RECOMMENDED DEFENSIVE MEASURES

7.1 CONCLUSIONS

- (U) Intelligence information gathered about the Marsaw Pact countries indicates that in the past, they have attempted development of an EN capability, Indirect evidence, e.g., mass rearing of potential insect vectors and working with microbiological agents compatible with EN that are not a problem in these countries, comprises the evidence available to indicate present activity in this area. The Marsaw Pact nations certainly have the capability to conduct EN.
- (U) The A. aegypti/yellow fever virus system is estimated to be the most likely antipersonnel EM system that could be used by the Warsaw Pact countries against the United States or the European NATO nations. Foot and mouth disease virus is a likely animal EM agent that could be effectively spread by M. domestica.
- (U) In the magnitude of the city attack scenarios described in this report, i.e., 16 simultaneous attacks on urban areas, the A. accyptofy yellow fever virus EM attack system was estimated to be less cost effective than the F. oxiamereis aerosol mode of attack in casualties produced, but it may be more cost effective when considering mortalities produced, but it may be more cost effective when considering mortalities produced. The A. accypts/yellow fever virus attack system becomes more cost effective in relation to the F. midarends aerosol attack mode if the magnitude of the attack becomes smaller, and less effective when the magnitude becomes greater. The A. accypts/yellow fever virus EM attack system also requires less expertise to develop and employ than the P. tularenais aerosol system
- (u) EN systems are not likely to be employed on military units because the agent vectors must be released too close to the target area. This would make a covert attack on a military unit very difficult to achieve. EN could be very effectively used against civilian urban populations or it could be used to cause great economic losses in the cattle and livestock industry.

7.2 RECOMMENDED DEFENSIVE MEASURES

(U) When an EN attack on a city is suspected or when a large population of mosquitoes or other insects unexpectedly appears in an abnormal way, reaction must be swift. Insecticide spray operations should be initiated as soon as possible. At the same time, the general population must be warned by radio, television, and newspapers. If the insects are mosquitoes the warning should include advice to stay indoors and the keep unscreened doors and windows closed at all times. Those who must venture outside should be protected as much as possible. Suggested protection should include wearing mosquito netting over face

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and neck and the use of mosquito repellant. Long sleeve shirts with gloves tightly fastened around the wrists should be worn. Pants should be fastened tightly around the ankles and two pairs of socks worn. Hats should be worn to protect the tops of heads.

- (U) Where possible, insecticide spraying should be started in individual dwellings. In the event of an EW plague attack, people should be assured that it is treatable and in the event of plague symptoms, antibiotic treatment must not be delayed. If sufficient evidence is available that a plague flea attack has occurred, and if sufficient antibiotics are available, antibiotic treatment of flea-bitten individuals might even be given before the appearance of symptoms.
- (U) Panic is one of the most important things to prevent in the event of an EW attack on the general population. People must be assured that, ordinarily, the best procedure for them to follow is not to flee the area but to stay and receive proper treatment, or if mosquitoes are the vector, to stay inside and stay protected.

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